*A STATISTICAL SURVEY OF INFANT MORTALITY'S URGENT CALL FOR ACTION.

By Edward Bunnell Phelps.

At the very outset, it should be clearly understood that all authorities on the subject long since concurred in restricting the application of the term Infant Mortality to deaths under one year of age, thus indirectly relegating to the class of Child Mortality all deaths of children between one and, say, five years. Consequently, all figures and statements in this paper dealing with Infant Mortality apply only to deaths under one year of age. The world's specialists on vital statistics have also tacitly agreed, for good and sufficient reasons which need not here be discussed, that the rate of Infant Mortality shall be calculated by the division of the number of deaths under one year by the number of births per annum—stillbirths excluded—instead of by the division of the number of deaths under one year by the living population under one year, as would be the case were the time-honored method of computing the death-rates at all other ages applied to Infant Mortality. The Infant Mortality ratio being worked out on a basis positively unique, it is, therefore, obvious that it cannot properly be compared, or contrasted, with the commonly-accepted death-rates for any other ages.

That the problem is world-wide in scope is conclusively proven by a tabulation of the Infant Mortality of thirty-one of the principal foreign countries for the quarter-century ending with 1905, compiled and published about two years ago (see Table I). Summarized in a single sentence, this table shows that on a broad average for twenty of the principal countries of Europe no less than 162 out of every 1,000 babies born alive died before completing the first twelve months, in the twenty-five years ending with 1905, and that

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in that same period the average ratio of deaths under one year to living births in thirty-one of the leading countries of the world, even including the seven divisions of Australasia with their exceptionally low rates of infant deaths, was 154. For only about one half of these countries are the Infant Mortality rates for the three years, 1906–08, now obtainable, and the sixteen countries in question had an average infant death-rate of 133 in 1906–08, as contrasted with one of 142 in 1901–05, and one of 150 for the twenty-five-year period ending with 1905.

Even were these records to be taken as absolutely worthy of credence, the apparent decrease in the three years ending with 1908 would indicate a decrease of less than two infant deaths per hundred living births in recent years as compared with the average for the quarter-century immediately preceding. But the figures in question can scarcely be taken at their full face value, although cited from the official vital statistics of the several countries, for the reason that in practically all countries there has been a greater improvement of late years in the registration of births than in that of infant deaths. And, as the infant death-rate is calculated by dividing the number of deaths under one by the number of registered births, the larger the registered percentage of births the larger will be the divisor, and the smaller will be the quotient—or apparent Infant Mortality rate—even though the actual numbers of births and infant deaths be identical for the two periods under comparison. It is evident, therefore, that *apparent* declines in the annual infant death-rates of the various countries, states and cities cannot be taken as conclusive, and should not so be taken unless carefully investigated and supported by corroborative data. This defect in the commonly-accepted statistics of Infant Mortality is especially prevalent in those for the registration states and cities of this country, as I shall later on endeavor to make clear.

For the time, it seems to be safe to assume that in the civilized world at large, outside of the United States, not less than thirteen out of every 100 babies born alive die within the first year. In some countries the infant death-rate is nearly,

if not quite, twice as high as that figure, but, dealing only with the broadest averages, the world's Infant Mortality now unquestionably amounts to thirteen deaths for every 100 living births. As the appended tabulations for this country make clear, the Infant Mortality rate for the United States is certainly no better than that for the rest of the world at large.

What is, or has been, the Infant Mortality of the United States as a whole? Nobody knows; and there is no means of finding out. The eighteen states and fifty-four cities in other states whose registration systems in 1909 were acceptable to the Bureau of the Census, include but 55.3 per cent. of the total estimated population of Continental United States for which returns for last year are presented in the Census Office's recent advance bulletin of *Mortality Statistics* for 1909, and but a single one of all the Southern states, namely, Maryland, figures in those statistics. Not only are mortality statistics for nearly one half of the population of Continental United States therefore unavailable, but as our national statistics for the registration area as yet present no birth returns—except for Census-taking years—it is a physical impossibility to compute the ratio of deaths under one year to living births, on the one universally-recognized basis, even for our registration area. To be sure, the majority of the registration states do issue annual compilations of their respective vital statistics, and most, if not all, of these com- pilations now include tabulations of living births and deaths at the various ages. Even the oldest and most reliable of these state systems of registration of births and deaths, that of. Massachusetts, has been unable to round out complete annual returns of births, however, and in the Sixty-Seventh Report of Births, Marriages and Deaths in Massachusetts, for the year 1908, a frank admission and partial explanation of this fact are made in these words (p. 142):

"Although the law applies to the registration of births, as well as to that of marriages and deaths, it is probable that the statistics of the births are less accurate than those of either of the other two classes. From the nature of things, marriages and deaths must be registered, in order that the former may be solemnized, or that interment be possible in

case of deaths; but in the case of the births, the inadequacy of penalty for neglect, ignorance of the law, as well as topographical conditions, tend to an incomplete registration. It is therefore likely that the number of births returned in Massachusetts in 1908 was less than the actual number which occurred; hence, a lower birth-rate, and comparisons between births and deaths inaccurate."

In many, if not most, of the other states which purport to present annual birth statistics, the registration of births is far more defective than in Massachusetts, and as an inevitable result of the incomplete returns for births the Infant Mortality rates—or ratios of deaths under age one to living births—presented in the annual reports of these states can only be taken in a Pickwickian sense, so to speak. The divisor being too small in every case—in some cases materially under the proper figure—of course the resultant, and apparent Infant Mortality rate, is above the actual rate. As the years roll by, the birth registration is doubtless improving in most cases, the margin of error is, therefore, continuously changing, and hence attempted comparisons of the apparent Infant Mortality rates of recent years with those of earlier years are more or less misleading.

Although no birth returns have been included in the Census Office's annual publications of *Mortality Statistics* for the last ten years, in all of these reports there has been a classification of deaths by ages in the constantly-changing registration area, and some idea of the movement of the Infant Mortality rate in so far as registration states and cities have been concerned may be had by a comparison of the annual ratios of deaths under one year with the total number of deaths at all ages in each of those years. Sometime ago I worked out such a comparison for the nine years ending with 1908, and now note in the advance bulletin of *Mortality Statistics* for 1909 that Doctor Wilbur suggests such a basis of comparison, and furnishes several tabulations on those lines which are of real value in any study of the Infant Mortality of this country. As he puts it (p. 11, Bulletin 108):

"When the proper statement of infant mortality is lacking, recourse may be had to the ratio between the number of deaths of infants under one year of age and the population under

one year, although this ratio is unsatisfactory for many reasons, and the population under one year is not available except by estimation for intercensal years. A very crude means of judging of the condition as regards the general extent of infant and child mortality is to compare the total number of deaths of infants under one year and of children under five years of age with the total number of deaths registered. Other things being equal—that is to say, with substantially similar populations with respect to age distribution and in the absence of epidemic diseases prevailing at higher age periods—the relative proportions of deaths of infants and children to the total number of deaths should show approximately the prevalence of infantile diseases and the importance of reducing the general mortality by efforts directed toward the prevention of infant mortality."

This means, in other words, that, in default of national figures for either births or living population under age one in the registration area, at least one available means of attempting to measure the Infant Mortality for that area is a comparison of the annual ratios of deaths under age one with the total number of deaths at all ages in that area. Such a comparison for the ten years 1900–1909 is presented in Table II. The table shows that in the quinquennial period, 1900–1904, the deaths under 1 year in the registration area amounted to 19.2 per cent. of the total deaths at all ages in that area; while in the quinquennial period, 1905–1909, the ratio had risen to 19.5 per cent., thus showing an apparent increase rather than decrease. But as Doctor Wilbur says this method of comparison is "a very crude means of judging of the condition," and its credibility depends upon the assumption that age distribution and population conditions were substantially similar during the periods of comparison. But practically no other means of even attempting to measure the rise or fall of the Infant Mortality rate for the registration area as a whole is possible, and there are some reasons for believing that, in the main, the ratio of infant deaths to deaths at all ages affords a fairly reliable index of the Infant Mortality situation under normal general conditions. In the case of the comparison of the ratios of 1900–1904 and 1905–1909, the differing conditions must be noted.

From 1900 to 1905, inclusive, the registration area remained practically unchanged, no additions of area being made, whereas in 1906 the states of California, Colorado, Maryland, Pennsylvania and South Dakota were added to the registration area, thus increasing the population of that area by more than 7,000,000, or more than 22 per cent. The addition of these five states materially increased the urban population of the registration area, and as the infant death-rate in the cities is, in general, considerably larger than that of the rural districts this radical change in the make-up of the registration area might confidently be expected to send up the infant death-rate of the area in question. But from 1900 to 1905, inclusive, the mortality statistics of the registration area dealt with precisely the same territory, hence are fairly comparable, and the registration returns for infant and child mortality for that period, as presented in Table II, are worthy of careful study. In the last of the six years in question, 1905, the deaths under one year were fewer by more than 6,000 than those in the first year of the period, 1900, the deaths between one and five years showed an even larger decrease, one of more than 10,500, and, of course, the total of deaths under age five had dropped to the extent of more than 16,500, the sum of the decreases in the previously-named age-groups. Assuming that the birth-rate for the six years was substantially uniform (the birth-rate in the census year 1900 was 27.2 per 1,000 of mean population in the United States), the natural growth of the population in the registration area between 1900 and 1905 (amounting to nearly 3,000,000) would indicate an increase of about 81,000 in the probable number of births in 1905 as compared with 1900, and at the ratio of deaths under age one to living births in the registration area in the census year 1900 (149.4 per 1,000), this increase in births would have involved an increase of more than 12,000 in the number of infant deaths in 1905 as contrasted with the number in the calendar year 1900.

As a matter of fact, there was a decrease of more than 6,000 in the number of infant deaths, instead of the presumable increase of more than 12,000, and that figure would seem to signify an *apparent* decline of more than 23 per cent. in the infant death-rate of 1905 for the registration area as compared

with that for the census year 1900 as shown by the Twelfth
Census.   Of course comparisons of single year's mortality are
open to many serious objections, but as the number of infant
deaths in the registration area in 1905 was higher by several
thousands than that of any of the years intervening between
1900 and 1905, the decrease in the actual number of deaths
under age one, in the face of a steadily-increasing population
and corresponding increase in the number of births, would
seem conclusively to indicate at least a slight decrease in the
infant death-rate.   The unquestionable decrease in the
general death-rate, from 1,755.0 per 100,000 in 1900 to 1,501.8
in 1909 in the registration area, the similar decrease in the
general death-rates of foreign countries, the comparatively
slight but almost invariable decline in the infant death-rate
in recent years in those states and foreign countries having
reasonably complete registration systems, and all collateral
evidence combine to suggest a small decrease in Infant Mor-
tality throughout the United States in the last decade.   But
positive evidence of that presumable decrease will not be
forthcoming until the Infant Mortality statistics of the
Thirteenth Census are available.   In any event, it is ex-
tremely improbable that the infant death-rate for the registra-
tion area, which was 149.4 per 1,000 living births in the
census year 1900, will prove to have dropped below 130 per
1,000 in the census year 1910.

   Much more convincing evidence of the hoped-for decrease
in the annual waste of infant life in this country is afforded
by the ten-year study of the registered living births, deaths
under age one, and deaths at all ages, and their respective
ratios, in certain states having well-established registration
systems, which I present in Table III.   Through the coöpera-
tion of the registration officials of Massachusetts, Connecti-
cut and New York I have been enabled to obtain the figures
for 1909 in advance of the publication of their several annual
reports, and in the case of Massachusetts and Connecticut
have thus been able to tabulate comparisons for the last ten
years; in the case of New York state, the comparison was
restricted to six years, as the New York State Department of
Health did not separately classify deaths under one year
prior to 1904.

The general significance of this table may be summarized in the statement that in both Connecticut and Massachusetts the number of deaths under one year was smaller in 1909 than in 1900, despite the decided increase in population and living births in each case, and the ratio of infant deaths to living births, of course, shows a marked decrease. In Connecticut there has been an apparent decrease of no less than forty infant deaths per 1,000 living births in the last ten years, and in Massachusetts there has been an apparent decrease of 29.5 in the same period. In the last six years the nominal ratio of infant deaths to living births in New York state has decreased 21.4, and in the face of the continuous increase in the population of the Empire State the number of infant deaths recorded for the entire state has increased only about 1,100 in 1909 as compared with 1904. Lest these large apparent declines in the infant death-rates of these three representative states may be taken more literally than the facts warrant, I must again call attention to the unquestioned increase of late years in the percentage of registered births, thanks to the vigorous efforts of the Division of Vital Statistics of the Bureau of the Census, and various other helpful agencies, and remind you that the actual decrease in Infant Mortality is therefore considerably smaller than the figures would seem to indicate if taken at their face value.

For instance, that excellent authority of almost life-long experience with vital statistics, Dr. William H. Guilfoy, registrar of records of the Department of Health of the City of New York, tells me that although from 92 to 95 per cent. of the actual births in the City of New York were probably registered in 1909, some authorities estimate that not more than 66 per cent. of the births in that same city were registered as late as 1900. Doctor Guilfoy believes that the percentage of registered births in 1900 was something like 80 per cent., but, even on that basis, there would have been a net increase of at least 15 per cent. in registered births in the City of New York in the last ten years, and in many other cities and districts the increase in the percentage of registered births has doubtless been very much larger. Consequently, the actual decline in Infant Mortality in the registration states of this

country unquestionably is much smaller than the apparent
decline, and in at least some foreign countries the same ex-
ception must be noted and taken into account in comparing
their official Infant Mortality figures.

By far the largest percentage of deaths under age one due
to any one class of causes is that of infant deaths caused by
diseases of the digestive system, which in 1909, for illustra-
tion, amounted to 29.5 per cent.   That is to say, almost one
third of all the deaths under age one in the registration area
of the United States in the last year were due to that one
class of disease.   Deaths due to diseases of early infancy
ranked second in numerical importance, footing up 23.9 per
cent., or nearly one quarter of the dread total, and diseases
of the respiratory system accounted for 16.5 per cent. of the
infant deaths in the registration area.   All told, these three
classes of causes carried off 69.9 per cent. of all the babies
under one year of age who died in that area in 1909.

As that eminent authority on the diseases of children,
Dr. L. Emmett Holt, put it in his address on "Infant Mortal-
ity and Its Reduction, Especially in New York City," before
the Section on Diseases of Children of the American Medical
Association, in June, 1909: "The fundamental causes of
Infant Mortality, as we may call them, are mainly the re-
sult of three conditions—poverty, ignorance and neglect.   .   .
The curve of diarrheal diseases is so important that it prac-
tically controls the curve of Infant Mortality.   This group
embraces acute gastritis, gastro-enteritis, all forms of acute
diarrhea, dysentry and cholera infantum and makes up the
largest part of the immense summer mortality.   It is these
diseases which cause regularly each year the sharp rise in
the death curve in July and August."   In citing these quota-
tions from Doctor Holt's paper, I have deliberately brought
together his authoritative statement of the fundamental
causes of Infant Mortality—poverty, ignorance and neg-
lect—and his comment on the commanding importance of
diarrheal diseases—especially in connection with the immense
summer mortality—although they were not associated in
his address.   For, it seems to me, if a layman may venture
to express an opinion on a phase of the Infant Mortality
problem which the specialists in pediatrics are so much more

competent to discuss, that the fundamental causes named by Doctor Holt—poverty, ignorance and neglect—in the natural course of things are much more potent factors in the summer months in making the Infant Mortality rate what it is than in any other season of the year.

In his paper on "Infantile Mortality and Its Principal Cause—Dirty Milk," the late Dr. Charles Harrington, secretary of the State Board of Health of Massachusetts, remarked apropos of the seasonal distribution of Infant Mortality: "From the facts and figures thus shown it might be inferred that all infants under one year of age are in great danger during the hot summer months, but this is far from being the case. Not the three summer months, but the first three months of life, are the dangerous period." Unquestionably true though this statement be, so comparatively few accurate records of infants' deaths by ages expressed in months are available and there is such a wealth of information as to the seasonal distribution of Infant Mortality, that public attention has much more graphically been drawn to the abnormal dangers of the summer months, and in my judgment the unusual Infant Mortality of that season of the year offers the foremost strategic point of effective attack for movements like that of this Association. Of course the fundamental causes of which Doctor Holt spoke are operative the year around, but it is in the summer months that those luxuries for the poor, abundant ice and pure milk, play the most important part in determining whether the babies of the poor shall live or die. Then it is that the unbearable heat of the tenements drives their unfortunate occupants of all ages into the streets, to the fire-escapes, and to the roofs, and then it is, as I see it, that poverty, ignorance and neglect, developed as it were by the summer heat, are most apt to exercise their baneful influences in raising the Infant Mortality rate to its top notch.

With the world at large it is the array of large figures, and not mere percentages, which makes the deepest impression. Consequently, in endeavoring to bring out the importance of the summer infant death-rate I have first tabulated a comparative statement, by weeks, of the births and infant deaths in the greatest city on this continent—and its various boroughs—in the third quarter of 1910 and 1909, and have

then emphasized the disheartening regularity of that sharp rise in Infant Mortality by a somewhat similar, though less detailed, presentation of corresponding figures for an entire state, Connecticut, for which monthly comparative figures for both years were available. The figures in Tables IV, V and VI, not only show how conspicuously the Infant Mortality rate mounts up in that season of the year, but how inflexible the increase seems to be, despite all the efforts now being made to grapple with it. The contrast between the summer rate and the annual rate of Infant Mortality is sharply brought out by the fact that in the third quarter of 1909 the ratio of deaths under age one to registered living births in the City of New York was 169 per 1,000, as against a ratio of only 130 for the entire year 1909—that is to say, was larger by an even 30 per cent.—and that the infant deaths in that quarter amounted to 32.15 per cent. of the total for the entire year. In the state of Connecticut, the infant death rate in the third quarter of 1909 was 192, as compared with one of 131 for the entire year 1909, an excess of nearly 47 per cent.

But those statistical facts are mere mathematical demonstrations of a well-known truth; a much more important showing of the tables is question in the fact that, despite all the wide fluctuations for individual weeks and individual boroughs in 1909 and 1910, the infant death-rate of the City of New York in the third quarter of 1910 was precisely identical with that for the corresponding quarter of 1909, namely, 169 per 1,000 registered living births. And the seeming inflexibility of summer Infant Mortality is strongly confirmed by the fact that in the entire state of Connecticut, of course including the rural districts along with the cities, the infant death-rate in the third quarter of 1910 was practically identical with that for the corresponding quarter of 1909, being 193 per 1,000 registered living births this year as compared with 192 per 1,000 registered living births in 1909. To be sure, comparisons for only two years are by no means convincing, but it is at least notable that in the case of both one of the world's greatest cities and an adjoining state with a widely-scattered population scarcely one-fifth as large as that of the metropolis, in the third quarter of 1909 and 1910 the respective infant death-rates for both years should be prac-

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tically identical. If allowance were to be made for the prob-
able slight improvement in the registration of births in both
instances in 1910, it would mean that the actual infant death-
rates for the third quarter in both cases were slightly larger
in 1910 than in 1909. But, in any event, the figures seem to
show that, in so far as merely two-year records can tell the
story, the Infant Mortality in both cases was quite as high
this year as last year, to say the least.

The final tables, VII and VIII, contain a succinct state-
ment of the number and percentage of infant deaths in the
registration area of the United States in the last ten years
due to the four principal causes of Infant Mortality, aside
from diseases of the respiratory system, namely, diarrhea
and enteritis, those diseases of early infancy, premature
birth and congenital debility, and that cause of death, perhaps
more or less closely allied with the causes which contribute
to premature birth and congenital debility, to wit, mal-
formations. In the decade 1900–1909, these four classes of
causes of death were responsible for no less than 52.05 per
cent. of all the deaths under age one recorded in the registra-
tion area of the United States, and in the latter half of that
period the percentage of deaths due to them was considerably
higher than in the former half, namely, 54.19 as compared
with 49.33. In every case except that of congenital debility,
the percentage of deaths from each of these four causes was
higher in 1905–1909 than in 1900–1904. Probably the in-
clusion of five additional states with many heavily-populated
cities in the registration area in the latter half of the period
has had something to do with increasing the percentage of
deaths due to these causes in 1905–1909 as compared with
1900–1904, but my recollection is that a similar tabulation
of deaths from these causes in certain large manufacturing
cities for a long series of years which I prepared some years
ago showed an almost unbroken increase from year to year
in each of these cities. As to this phase of the subject, the
statistician's work properly ends when he has tabulated, and
presented in proper form, the actual figures; the discussion
of the reasons for the fact, and the significance of it, does
not come within his province, and that branch of the subject
of Infant Mortality belongs to, and should be left with,
the medical profession.

TABLE I.

THE INFANT MORTALITY RATES OF 31 PRINCIPAL COUNTRIES, BY FIVE-YEAR PERIODS, 1881–1905, AND THE ANNUAL INFANT MORTALITY RATES OF 16 OF THOSE COUNTRIES, 1906–1908.

Countries.	Deaths under Age 1 per 1,000 Living Births.									
	1881–1885.	1886–1890.	1891–1895.	1896–1900.	1901–1905.	1881–1905.	1906.	1907.	1908.	1906–1908.
Norway...............	99	96	98	96	81	94	...	...	...	...
Ireland................	94	95	102	106	98	99	93	92	97	94
Sweden...............	116	105	103	101	92*	104*	...	...	...	...
Bulgaria..............	81	95	140	143	145*	120*	...	...	...	...
Scotland..............	117	121	126	129	120	123	...	...	...	...
Denmark..............	134	137	139	132	119	132	...	...	...	...
Finland...............	162	144	145	139	131	144	...	...	...	...
England and Wales.....	139	145	151	156	138	146	132	118	120	123
Switzerland............	171	159	155	143	134	153	...	...	...	...
Belgium...............	156	163	164	158	148	158	...	...	...	...
Servia.................	157	158	172	159	149	159	144	147	158	150
France................	167	166	171	159	139	160	...	...	...	...
The Netherlands.......	181	175	165	151	136	162	127	112	125	121
Italy..................	**175**	**175**	185	168	168	175*	...	...	...	...
Spain.................	193	186*	**185**	185	173	185*	...	...	...	...
Prussia................	207	208	205	201	190	202	177	168	173	173
Roumania.............	182	195	220	216*	**203**	203*	...	...	...	...
Austria................	**223**	**223**	**223**	226	213*	223*	...	...	...	...
Hungary..............	**226**	**226**	250	219	212	226*	205	208	199	204
Russia in Europe.......	271	264	276	261	**268**	268*	...	...	...	...
Averages for Europe....	163	162	169	162	153	162	146	141	145	144
New Zealand..........	90	84	87	80	75	83	62	89	68	73
Tasmania..............	109	103	94	98	90	99	91	82	75	83
South Australia........	**101**	105	99	112	87	101*	76	66	70	71
Queensland............	136	119	103	104	95	111	75	77	70	74
New South Wales.......	124	115	111	113	97	112	75	89	76	80
Victoria...............	122	131	111	111	96	114	93	73	86	84
Western Australia......	**135**	123	130	160	126	135*	110	98	85	98
Averages for Australasia	117	111	105	111	95	108	83	82	76	80
Japan.................	104	116	147	153	154	135	...	...	...	...
Ceylon................	158	158	169	168	171	165	198	186	183	189
Jamaica...............	158	170	171	175	174	169	197	223	175	198
Chili..................	**314**	264	336	333	332*	314*	328	297	320	315
Averages for Countries Named..............	184	177	206	207	208	196	241	235	226	234

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Europe................	163	162	169	162	153	162	146	141	145	144
Australasia............	117	111	105	111	95	108	83	82	76	80
Other Lands...........	184	177	206	207	208	196	241	235	226	234
† Grand Averages.......	155	152	159	157	147	154	136	133	130	13 3

* Returns for one or more years wanting, and averages have been calculated on basis of returns for other years of period in question.

† Computed by division of totals for all countries represented in table by number of countries in question.

Bold-faced figures represent estimates for periods for which no returns were available, estimate in each case being average of actual returns for balance of entire twenty-five-year period.

The above table has been compiled in part from Table III in Phelps' "A Statistical Study of Infant Mortality," in the Quarterly Publications of the American Statistical Association, New Series, No. 83 (Vol. XI), September, 1908, and data for years 1906–08 have been compiled from Seventy-First Annual Report of the Registrar-General for England and Wales (p. lxvii).

TABLE II.

A COMPARISON OF DEATHS BY AGE GROUPS WITH TOTAL DEATHS AT AL L AGES IN THE REGISTRATION AREA OF THE UNITED STATES, AS SHOW N BY THE ANNUAL MORTALITY STATISTICS OF THE BUREAU OF THE CENSUS 1900-1909.

Years	Deaths in the Registration Area.					Ratios to Total Deaths at All Ages.			
	Total at All Ages.	Under 1 Year.	Between 1 and 5 Years.	Under 5 Years.	At All Ages over 1 Year.	Under 1 Year.	1-5 Years.	Under 5 Years.	Over 1 Year.
1900	539,939	111,687	52,450	164,137	428,252	20.7	9.7	30.4	79.3
1901	518,207	97,477	44,201	141,678	420,730	18.8	8.5	27.3	81.2
1902	508,640	98,575	44,940	143,515	410,065	19.4	8.8	28.2	80.6
1903	524,415	96,857	43,083	139,940	427,558	18.5	8.2	26.7	81.5
1904	551,354	102,880	43,022	145,902	448,474	18.7	7.8	26.5	81.3
1905	545,533	105,553	41,831	147,384	439,980	19.3	7.7	27.0	80.7
1906	658,105	133,105	53,873	186,978	525,000	20.2	8.2	28.4	79.8
1907	687,034	131,110	52,664	183,774	555,924	19.1	7.7	26.8	80.9
1908	691,574	136,432	53,433	189,865	555,142	19.7	7.7	27.5	80.3
1909	732,538	140,057	56,477	196,534	592,481	19.1	7.7	26.8	80.9
Total	5,957,339	1,153,733	485,974	1,639,707	4,803,606	19.4	8.2	27.5	80.6
1900–1904	2,642,555	507,476	227,696	735,172	2,135,079	19.2	8.6	27.8	80.8
1905–1909	3,314,784	646,257	258,278	904,535	2,668,527	19.5	7.8	27.3	80.5

TABLE III.

A COMPARISON OF LIVING BIRTHS, DEATHS UNDER 1 YEAR, AND TOTAL DEATHS AT ALL AGES, IN CONNECTICUT, MASSA-CHUSETTS AND NEW YORK, AS SHOWN BY THEIR RESPECTIVE ANNUAL REGISTRATION REPORTS, 1900–1909.

| Years. | Connecticut. | | | | | Massachusetts. | | | | | New York. | | | | |
| | Deaths. | | Living Births. | Ratios of Deaths Under 1 Year. | | Deaths. | | Living Births. | Ratios of Deaths Under 1 Year. | | Deaths. | | Living Births. | Ratios of Deaths Under 1 Year. | |
	At All Ages.	Under 1 Year.		To Total Deaths.	Per 1,000 Births.	At All Ages.	Under 1 Year.		To Total Deaths.	Per 1,000 Births.	At All Ages.	Under 1 Year.		To Total Deaths.	Per 1,000 Births.
1900	16,368	3,521	20,560	21.5	171.3	51,156	11,500	73,386	22.5	156.7	......	......	......	......	......
1901	14,856	2,805	20,294	18.9	138.2	48,275	9,952	71,976	20.6	138.3	......	......	......	......	......
1902	14,386	2,864	21,216	19.9	135.0	47,491	10,075	72,219	21.2	139.5	......	......	......	......	......
1903	15,490	2,972	21,751	19.2	136.6	49,054	10,269	73,584	20.9	139.6	......	......	......	......	......
1904	15,711	3,033	22,864	19.3	132.7	48,482	9,992	75,014	20.6	133.2	142,217	24,909	165,014	17.5	151.0
1905	16,298	3,159	23,271	19.4	135.7	50,486	10,519	75,022	20.8	140.2	137,435	25,827	172,259	18.8	150.0
1906	16,766	3,455	24,641	20.6	140.2	50,624	11,106	80,237	21.9	138.4	141,099	27,114	183,012	19.2	148.2
1907	17,490	3,433	25,945	19.6	132.3	54,234	11,293	85,001	20.8	132.9	147,130	28,011	196,020	19.0	142.9
1908	16,000	3,251	26,694	20.3	121.8	51,788	11,606	86,911	22.4	133.5	138,912	26,561	203,159	19.1	130.7
1909	16,460	*3,353	25,530	20.4	131.3	51,236	10,693	84,039	20.9	127.2	139,783	26,031	200,865	18.6	129.6
1900–1909	159,825	31,846	232,766	19.9	136.8	502,826	107,005	777,389	21.3	137.7	†846,576	†158,453	†1,120,329	†18.7	†141.4
1900–1904	76,811	15,195	106,685	19.8	142.4	244,458	51,788	366,179	21.2	141.4	......	......	......	......	......
1905–1909	83,014	16,651	126,081	20.1	132.1	258,368	55,217	411,210	21.4	134.3	704,359	133,544	955,315	19.0	139.8

* From the Bureau of the Census's advance Mortality Statistics for 1909.
† Totals for years 1904–09, deaths under one year not having been separately classified by the New York State Department of Health prior to 1904.

TABLE IV.

A WEEKLY COMPARISON OF BIRTHS AND DEATHS UNDER AGE 1 IN THE FIVE BOROUGHS OF NEW YORK CITY IN THE SEASON OF THE HEAVIEST INFANT MORTALITY, 1909 AND 1910, COMPILED FROM THE WEEKLY REPORTS OF THE DEPARTMENT OF HEALTH OF THE CITY.

Week ending	Manhattan Births	Manhattan Deaths Under 1 Year.	The Bronx Births	The Bronx Deaths Under 1 Year.	Brooklyn Births	Brooklyn Deaths Under 1 Year.	Queens Births	Queens Deaths Under 1 Year.	Richmond Births	Richmond Deaths Under 1 Year.	City of New York Births.	City of New York Total Deaths Under 1 Year.	City of New York Per 1,000 Births
July 9, 1910	1,332	202	222	22	796	167	119	38	52	9	2,521	438	174
July 10, 1909	1,263	144	288	17	768	117	95	23	26	2	2,440	303	124
July 16, 1910	1,284	262	215	33	921	209	123	46	36	18	2,579	568	220
July 17, 1909	1,205	175	151	15	767	167	164	31	35	11	2,322	399	172
July 23, 1910	1,373	270	251	39	932	165	166	32	28	17	2,750	523	190
July 24, 1909	1,279	201	224	27	878	183	107	26	30	10	2,518	447	178
July 30, 1910	1,131	310	248	23	894	174	169	28	35	10	2,477	545	220
July 31, 1909	1,203	225	166	37	785	172	146	35	40	17	2,340	486	208
Aug. 6, 1910	1,420	272	198	28	860	126	174	29	42	17	2,694	472	175
Aug. 7, 1909	1,248	272	177	34	864	155	116	26	69	14	2,474	501	203
Aug. 13, 1910	1,332	240	216	20	832	125	126	28	44	9	2,550	422	165
Aug. 14, 1909	1,204	278	204	39	732	146	119	25	57	16	2,316	504	218
Aug. 20, 1910	1,197	194	234	21	786	140	140	25	54	16	2,411	396	164
Aug. 21, 1909	1,141	215	76	25	858	117	109	29	40	7	2,224	393	177
Aug. 27, 1910	1,153	220	184	34	750	111	98	27	51	10	2,236	402	180
Aug. 28, 1909	1,221	206	208	22	696	107	104	22	17	10	2,246	367	163
Sept. 3, 1910	1,354	209	200	28	877	96	170	23	60	9	2,661	365	137
Sept. 4, 1909	1,191	186	201	24	821	94	163	29	47	14	2,423	347	143
Sept. 10, 1910	1,132	235	178	27	873	109	128	27	72	5	2,383	403	169
Sept. 11, 1909	1,191	205	156	19	813	120	115	18	36	8	2,311	370	160
Sept. 17, 1910	1,374	180	230	25	864	109	164	13	27	2	2,659	329	124
Sept. 18, 1909	1,077	191	192	23	755	114	97	18	46	5	2,167	351	162
Sept. 24, 1910	1,122	175	235	30	753	116	112	16	39	6	2,261	343	152
Sept. 25, 1909	1,273	161	139	25	888	127	88	22	15	12	2,403	347	144
Oct. 1, 1910	1,301	171	210	28	927	89	92	16	22	7	2,552	311	122
Oct. 2, 1909	1,185	173	108	14	699	106	148	17	39	12	2,179	322	148
Totals for third quarter 1910	16,505	2,940	2,821	358	11,065	1,736	1,781	348	562	135	32,734	5,517	169
1909	15,681	2,632	2,290	321	10,324	1,725	1,571	321	497	138	30,363	5,137	169

TABLE V.

A COMPARATIVE RÉSUMÉ OF BIRTHS AND DEATHS UNDER AGE 1, IN THE BOROUGHS OF NEW YORK CITY IN THE SEASON OF THE HEAVIEST INFANT MORTALITY, 1910 AND 1909, COMPILED FROM THE WEEKLY REPORTS OF THE DEPARTMENT OF HEALTH OF THE CITY.

Boroughs of the City of New York.	Third Quarter of 1910.			Third Quarter of 1909.		
	Living Births.	Deaths under 1 Year.		Living Births.	Deaths under 1 Year.	
		Number.	Per 1,000 Births.		Number.	Per 1,000 Births.
Manhattan...................	16,505	2,940	178	15,681	2,632	168
The Bronx...................	2,821	358	127	2,290	321	140
Brooklyn....................	11,065	1,736	157	10,324	1,725	167
Queens.....................	1,781	348	195	1,571	321	204
Richmond..................	562	135	240	497	138	278
Totals.....................	32,734	5,517	169	30,363	5,137	169

TABLE VI.

A SIMILAR RÉSUMÉ, BY MONTHS, FOR THE STATE OF CONNECTICUT, COMPILED FROM THE MONTHLY BULLETINS OF THE CONNECTICUT STATE BOARD OF HEALTH.

Months.	Third Quarter of 1910.			Third Quarter of 1909.		
	Living Births.	Deaths under 1 Year.		Living Births.	Deaths under 1 Year.	
		Number.	Per 1,000 Births.		Number.	Per 1,000 Births.
July.......................	2,363	587	248	2,115	407	192
August.....................	2,353	404	172	2,290	483	211
September..................	2,210	343	155	2,180	373	171
Totals.....................	6,926	1,334	193	6,585	1,263	192

TABLE VII.

A REVIEW OF THE INCREASING WASTE OF INFANT LIFE DUE TO THE FOUR
PRINCIPAL CAUSES OF INFANT MORTALITY, IN THE REGISTRATION
AREA OF THE UNITED STATES, AS RECORDED IN THE ANNUAL MOR-
TALITY STATISTICS OF THE BUREAU OF THE CENSUS, 1900–1909.

Years.	Deaths under 1 Year from All Causes.	Deaths under 1 Year from Four Principal Causes.					
		Diarrhea and Enteritis.	Diseases of Early Infancy.		Malform-ations.	Total Deaths from These Four Causes.	
			Prema-ture Birth.	Congeni-tal Debility.		Number.	Percent-age of all Deaths under 1 Year.
1900........	111,687	27,627	10,170	13,484	3,227	54,508	48.80
1901........	97,477	23,357	8,615	12,107	3,136	47,215	48.44
1902........	98,575	21,912	9,087	12,724	3,165	46,888	47.57
1903........	96,857	22,202	10,143	12,371	3,677	48,393	49.96
1904........	102,880	25,286	11,361	12,640	4,046	53,333	51.84
1905........	105,553	27,455	11,102	12,515	4,299	55,371	52.46
1906........	133,105	35,220	14,250	15,493	5,857	70,820	53.21
1907........	131,110	34,408	15,245	15,392	6,057	71,102	54.23
1908........	136,432	37,049	16,441	15,833	6,525	75,848	55.59
1909........	140,057	36,516	18,286	14,988	7,286	77,076	55.03
Totals 1900–09	1,153,733	291,032	124,700	137,547	47,275	600,554	52.05
1900–04	507,476	120,384	49,376	63,326	17,251	250,337	49.33
1905–09	646,257	170,648	75,324	74,221	30,024	350,217	54.19

Infant Mortality.

TABLE VIII.

A RECAPITULATION OF DEATHS UNDER AGE 1 DUE TO EACH OF THE FOUR PRINCIPAL CAUSES OF INFANT MORTALITY IN THE REGISTRATION AREA OF THE UNITED STATES AS SHOWN BY THE DETAILED STATISTICS IN TABLE VII.

Causes of Death.	Deaths under 1 Year in the Last Decade.					
	Ten-year Period, 1900–1909.		First Half of Period, 1900–04.		Second Half of Period, 1905–09.	
	Deaths.	Per cent of Total.	Deaths.	Per cent of Total.	Deaths.	Per cent of Total.
All causes......................	1,153,733	......	507,476	......	646,257	....
Diarrhea and enteritis...........	291,032	25.23	120,384	23.72	170,648	26.41
Diseases of early infancy.						
Premature birth..............	124,700	10.81	49,376	9.73	75,324	11.66
Congenital debility	137,547	11.92	63,326	12.48	74,221	11.48
Malformations	47,275	4.10	17,251	3.40	30,024	4.65
Total, four above-named causes..	600,554	52.05	250,337	49.33	350,217	54.19